

Detailed Upper Crustal Structure across the Itoigawa-Shizuoka Tectonic Line from the 2002 Seismic Expedition

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The northern Fossa Magna basin, which is a Miocene rift system formed in the final stages of the opening of the Sea of Japan, divides the Japanese Island Arc into its NE and SW parts with different trending geological structures. The Itoigawa-Shizuoka Tectonic Line (ISTL) is located at the western rim of the northern Fossa Magna and characterized as an active fault system with a rather large slip rates (4-9 mm/yr). Deep seismic reflection and refraction/wide-angle reflection profiling across ISTL was undertaken in 2002 to elucidate structures in the crust, and the deep geometry of the active fault systems. The refraction analysis to these data delineated upper crustal structural heterogeneity along the profile in terms of seismic velocity. The velocity structure within the northern Fossa Magna is composed of 1.9-4.6 km/s materials whose total thickness amounts to 2 km. At the Otari-Nakayama fault 3km east of ISTL, the velocity structure shows a very sharp change. East of the fault, a wedge-like 2.8-3.7 km/s body is subducted down to a depth of 1km, while, in the east of the fault, 3.4-4.6 km/s materials exist down to 2 km depth. The top of the pre-Neogene basement is traced as an eastward dipping layer with a velocity of 4.8-5.4 km/s. In the central part of the profile, just east of the Fossa Magna, a high velocity material of 4.9-5.4 km/s is situated up to 0.2-0.3 km depth forming a dome structure. The basin east of the Central Uplift Zone has a 5 km thick undeformed structure whose velocity is 2.5-5.4 km/s. Wide-angle reflections indicate the existence of reflective zones beginning at 11 and 22 km depths. Most of earthquakes in this area are concentrated in a depth range of 3-10 km above these reflective zones.